Role of the medical physicist in the safe and appropriate use of radiation medical devices

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Outline

- General remarks: Medical Physics Expert (MPE)
- MPE in 97/43/EURATOM directive
- “European guidelines on MPE” project
- Example: Situation in Switzerland
- MP in developed vs. developing countries
Medical physics in clinical and research environments

A qualified medical physicist is an individual who is competent to practice independently one or more of the subfields of medical physics (see for e.g. IOMP/EFOMP recommendations).

Medical physicists are generally involved in four areas of activities:

- clinical service and consultation;
- research and development;
- teaching, and
- Administration

Usually a medical physicist is involved in all four areas; the relative distribution of responsibilities, however, varies considerably from one physicist to another, depending on the particular situation of the employer as well as on the educational background and interest of the physicist.
Inconsistencies between EC directives

- There are a number of European Council directives associated with the uses of ionising radiations.

- These are now mostly dated and inconsistencies between various directives are showing.

- The European Commission therefore set about resolving these inconsistencies and also simplifying them by forming one overarching directive. This directive is entitled “basic safety standards for protection against the dangers arising from exposure to ionising radiation” or more simply it is known as the ‘recast BSS’ (Basic Safety Standards). This directive brings together five Euratom Council directives on radiation protection, namely:

  ✓ Council Directive 96/29/Euratom, basic safety standards
MPE in 97/43/EURATOM directive

Revision and Recast of Euratom Radiation Protection Directives

EUROPEAN COMMISSION

Brussels, 30.5.2012
COM(2012) 242 final
2011/0254 (NLE)

Proposal for a

COUNCIL DIRECTIVE

laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation
Medical Physics Expert (Art. 2 – definitions)

- Expert in radiation physics or radiation technology applied to medical exposure, whose training and competence to act is recognized by the competent Authorities.

- As appropriate, acts or gives advice on:
  - Patient dosimetry,
  - The development and use of complex techniques and equipment,
  - Optimization,
  - Quality assurance, including quality control,
  - Other matters relating to radiation protection, concerning medical exposure.
The involvement of the MPE in the areas of radiotherapy, nuclear medicine and diagnostic and interventional radiology has been requalified under the recast BSS.

1. In radiotherapeutic practices, other than standardised therapeutic nuclear medicine practices, *a medical physics expert shall be closely involved.*

2. In standardised therapeutical nuclear medicine and diagnostic practices, as well as in radiodiagnostic and interventional radiology practices, *a medical physics expert shall be involved.*

3. For other simple radiodiagnostic procedures, *a medical physics expert shall be involved, as appropriate, for consultation* and advice on matters relating to radiation protection concerning medical exposure.

Art. 57 - Procedures
**MPE in 97/43/EURATOM directive**

1. Within the healthcare environment, the MPE shall, as appropriate, act or give specialist advice on matters relating to radiation physics as applied to medical exposure.

2. Depending on the medical radiological practice, the MPE shall take responsibility for dosimetry, including physical measurements for evaluation of the dose delivered to the patient, give advice on medical radiological equipment, and contribute in particular to the following:
   
   a. optimisation of the radiation protection of patients and other individuals subjected to medical exposure, including the application and use of diagnostic reference levels;
   
   b. the definition and performance of quality assurance of the medical radiological equipment;
   
   c. the preparation of technical specifications for medical radiological equipment and installation design;
   
   d. the surveillance of the medical radiological installations with regard to radiation protection;
   
   e. the selection of equipment required to perform radiation protection measurements;
   
   f. the training of practitioners and other staff in relevant aspects of radiation protection.

   Where appropriate, the task of the medical physics expert may be carried out by a medical physics service.
**MPE in 97/43/EURATOM directive**

a. all medical radiological equipment in use is kept under strict surveillance regarding radiation protection;

b. an up-to-date inventory of medical radiological equipment for each medical radiological installation is available to the competent authorities;

c. appropriate quality assurance programmes and dose or administered activity assessments are implemented by the undertaking; and

d. acceptance testing, involving the medical physics expert, is carried out before the first use of the equipment for clinical purposes, and performance testing is carried out thereafter on a regular basis, and after any major maintenance procedure.

*Art. 59 (Equipment)*
These European “Guidelines on Medical Physics Expert” have been prepared in the context of the EC project “Guidelines on Medical Physics Expert”, financed by the EC (Contract TREN/09/NUCL/SI2.549828)

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<th>Status</th>
<th>Organisation</th>
<th>Responsible person(s)</th>
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</thead>
<tbody>
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<td>World Health Organisation, WHO</td>
<td>Feridun Shannoun</td>
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<td></td>
<td>Working Party on Medical Exposures, Art. 31 Euratom</td>
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https://portal.ucm.es/web/medical-physics-expert-project/
EC Guidelines on MPE

Guidelines on Medical Physics Expert Project
TREN/09/NUCL/SI2.549828

Proceedings on the EC International Workshop
9/10 May 2011
Seville

https://portal.ucm.es/web/medical-physics-expert-project/

E. Guibelalde & M. Kennedy editors. University Complutense of Madrid. Spain
EC Guidelines on MPE

"European Guidelines on Medical Physics Expert"

(Updated November 2013
Draft pending approval by Art.31
EURATOM plenary meeting)

https://portal.ucm.es/web/medical-physics-expert-project/
Tasks of medical physicist are defined by FOPH report «requirements for medical physicists in Nuclear medicine and Radiology»

“Consensus” of a WG of representatives of the different scientific societies
Tasks of the medical physicist

Objective of article 74

The objective of article 74.7 is to optimize radiation protection of patients and staff for high-dose procedures in diagnostic radiology and nuclear medicine.

Team work MP, technologist, Physician

Main tasks and duties of medical physicists

- Quality assurance relating to patient dose
- Verification and optimization of patient and staff doses
- Training and coaching of technologists and physicians
Tasks of the medical physicist

Recommended contractual hiring times of MPs:

<table>
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<tr>
<th>Modality</th>
<th>QA relating to patient dose</th>
<th>Verification and optimization of patient and staff dose</th>
<th>Training and coaching of technologists and physicians *</th>
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<td>1.5</td>
<td>3</td>
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<td>1.5</td>
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<td>1</td>
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<tr>
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<td>1.5</td>
<td>2.5</td>
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<tr>
<td>PET</td>
<td>0.5</td>
<td>0.75</td>
<td>1.5</td>
<td>2.75</td>
</tr>
<tr>
<td>SPECT/CT</td>
<td>1</td>
<td>1.5</td>
<td>3</td>
<td>5.5</td>
</tr>
<tr>
<td>PET/CT</td>
<td>1</td>
<td>1.75</td>
<td>3</td>
<td>5.75</td>
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What do the clinicians need vs what can the physicists deliver: The new challenges of biomedical imaging research

First UAE International Conference on Biological and Medical Physics
27-30 March 2005

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Clinicians are from Mars

Physicists are from Venus
Clinicians are from Mars
Physicists are from Venus

Typical discussion between a physicist and a physician...

You want proof? I'll give you proof!
Summary

Overall...
Physicians Are NOT From Venice
Physicists Are NOT From the Moon

However, some physicians are from Venus
and
some physicists are from Mars
Medical physics in developed countries

"Medical physicists need to be actually doing medical physics, not spending too much time on administration, business, grant writing, scientific politics and unnecessary committee and professional society work" … “They should at the very least, stay active part-time research workers and/or clinical service scientists”

“It is the duty of developed governments to translate and adapt those novel techniques to the particular needs of developing countries”
It is the role of the countries needing novel technologies to acquire the knowledge required for translation and adaptation, as this task is not the priority for developed nations, where young medical physicists practicing in these countries are focused on building their careers.

Medical physicists in developing countries should be talented and have plenty of additional skills to be able to handle complex issues efficiently. They should also be clever, diplomatic and excellent communicators to convince their administrators (usually inexperts in applications of science in medicine) about the importance of their work and its implications on healthcare delivery.
Items for discussion

- What is the added value of medical physicists in a radiation medicine facility (apart from classic activities)? Does it justify the additional cost?
- How can we improve education and training of medical physicists?
- How can we help developing countries to develop education and training programs and policies for effective and accessible care within established budgetary constraints?
- How can we obtain reliable data for analysis of available resources for medical physics support in developing countries (urgently needed) to serve as a baseline to assist plan future development in the region?
- Did we learn from past mistakes? What are the political lessons to be learned?
- Should the policies of international organizations be revisited and their roles redefined?
Pivotal role of the medical physicist in diagnostic imaging: the new challenges of hybrid imaging technology

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